WEST Search History

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DATE: Monday, November 22, 2004

Hide?	Set Name	Query	Hit Count
		DB=EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR	
☐	L17	L14	14
☐	L16	L13	177
		DB=PGPB,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR	
☐	L15	L14 and telemat$	9
☐	L14	L13 and (coordinate or latitude or longitude)	437
☐	L13	L12 and (neural$ or ai or artificial$ or behavior$ or pattern$)	1482
☐	L12	(compar$ with (locati$ or position or address$) with (prior or previous or before))	5379
☐	L11	L4 and vehicle	0
		DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR	
☐	L10	L6 and telemat$	1
☐	L9	L8 and (coordinate or latitude or longitude)	1
☐	L8	L6 and (vehic$ with (direction or heading or speed$))	1
☐	L7	L6 and (neural$ or ai or artificial$ or behavior$ or pattern$)	0
☐	L6	L5 and l3	1
☐	L5	L4 and l2	152
☐	L4	(compar$ with (locati$ or position or address$) with (prior or previous or before))	12268
☐	L3	L2 and l1	7
☐	L2	701/207-210,200-202,23,27,213-216.ccls.	4278
☐	L1	6650284.pn. or 6067501.pn. or 6597906.pn. or 6594564.pn. or 6748318.pn. or 6169515.pn. or 6526352.pn. or 6567745.pn. or 6553308.pn. or 6327522.pn.	10

END OF SEARCH HISTORY

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Search Results - Record(s) 1 through 9 of 9 returned.

☐ 1. Document ID: US 20040129478 A1

Using default format because multiple data bases are involved.

L15: Entry 1 of 9 File: PGPB Jul 8, 2004

PGPUB-DOCUMENT-NUMBER: 20040129478
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20040129478 A1

TITLE: Weight measuring systems and methods for vehicles

PUBLICATION-DATE: July 8, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Breed, David S.	Boonton Township	NJ	US	
DuVall, Wilbur E.	Kimberling City	MO	US	
Johnson, Wendell C.	Signal Hill	CA	US	

US-CL-CURRENT: 180/273; 280/735

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 20040054428 A1

L15: Entry 2 of 9 File: PGPB Mar 18, 2004

PGPUB-DOCUMENT-NUMBER: 20040054428
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20040054428 A1

TITLE: Method and apparatus for sending, retrieving and planning location relevant information

PUBLICATION-DATE: March 18, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Sheha, Michael A.	Laguna Niguel	CA	US	
Sheha, Angie	Laguna Niguel	CA	US	
Petilli, Stephen	Laguna Niguel	CA	US	

US-CL-CURRENT: 700/56

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De

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☐ 3. Document ID: US 20030209893 A1

L15: Entry 3 of 9 File: PGPB Nov 13, 2003

PGPUB-DOCUMENT-NUMBER: 20030209893
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030209893 A1

TITLE: Occupant sensing system

PUBLICATION-DATE: November 13, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Breed, David S.	Boonton Township	NJ	US	
DuVall, Wilbur E.	Kimberling City	MO	US	
Johnson, Wendell C.	Signal Hill	CA	US	

US-CL-CURRENT: 280/735; 701/45

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De

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☐ 4. Document ID: US 20030184065 A1

L15: Entry 4 of 9 File: PGPB Oct 2, 2003

PGPUB-DOCUMENT-NUMBER: 20030184065
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030184065 A1

TITLE: Rear view mirror monitor

PUBLICATION-DATE: October 2, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Breed, David S.	Boonton Township	NJ	US	
DuVall, Wilbur E.	Kimberling City	MO	US	
Johnson, Wendell C.	Signal Hill	CA	US	

US-CL-CURRENT: 280/735

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De

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☐ 5. Document ID: US 20030169185 A1

L15: Entry 5 of 9 File: PGPB Sep 11, 2003

PGPUB-DOCUMENT-NUMBER: 20030169185
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030169185 A1

TITLE: Intelligent selectively-targeted communications systems and methods for aircraft

PUBLICATION-DATE: September 11, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Taylor, Lance G.	Victorville	CA	US	

US-CL-CURRENT: 340/945; 340/902

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De

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☐ 6. Document ID: US 20030169181 A1

L15: Entry 6 of 9 File: PGPB Sep 11, 2003

PGPUB-DOCUMENT-NUMBER: 20030169181
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030169181 A1

TITLE: Intelligent selectively-targeted communications systems and methods

PUBLICATION-DATE: September 11, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Taylor, Lance G.	Victorville	CA	US	

US-CL-CURRENT: 340/902; 340/945

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De

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☐ 7. Document ID: US 20030167121 A1

L15: Entry 7 of 9 File: PGPB Sep 4, 2003

PGPUB-DOCUMENT-NUMBER: 20030167121
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030167121 A1

TITLE: Electronic compass system

PUBLICATION-DATE: September 4, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Ockerse, Harold C.	Holland	MI	US	
Bechtel, Jon H.	Holland	MI	US	
Bugno, Mark D.	Stevensville	MI	US	

US-CL-CURRENT: 701/224; 33/356, 33/357

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 8. Document ID: US 20030093187 A1

L15: Entry 8 of 9 File: PGPB May 15, 2003

PGPUB-DOCUMENT-NUMBER: 20030093187
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030093187 A1

TITLE: PFN/TRAC systemTM FAA upgrades for accountable remote and robotics control to stop the unauthorized use of aircraft and to improve equipment management and public safety in transportation

PUBLICATION-DATE: May 15, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Walker, Richard C.	Waldorf	MD	US	

US-CL-CURRENT: 701/1; 701/36

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 9. Document ID: US 20020140215 A1

L15: Entry 9 of 9 File: PGPB Oct 3, 2002

PGPUB-DOCUMENT-NUMBER: 20020140215
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020140215 A1

TITLE: Vehicle object detection system and method

PUBLICATION-DATE: October 3, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Breed, David S.	Boonton Township	NJ	US	
DuVall, Wilbur E.	Kimberling City	MO	US	

Johnson, Wendell C. Signal Hill CA US

US-CL-CURRENT: 280/735

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw De

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Search Results - Record(s) 1 through 10 of 14 returned.

☐ 1. Document ID: JP 411135405 A

Using default format because multiple data bases are involved.

L17: Entry 1 of 14 File: JPAB May 21, 1999

PUB-NO: JP411135405A
DOCUMENT-IDENTIFIER: JP 411135405 A
TITLE: METHOD FOR VERIFICATION OF PATTERN ONE-SHOT EXPOSURE DATA

PUBN-DATE: May 21, 1999

INVENTOR-INFORMATION:

NAME	COUNTRY
TAMURA, TAKAHISA	

INT-CL (IPC): H01 L 21/027; G03 F 7/20; G06 F 17/50; H01 L 21/82

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 2. Document ID: JP 11083487 A

L17: Entry 2 of 14 File: JPAB Mar 26, 1999

PUB-NO: JP411083487A
DOCUMENT-IDENTIFIER: JP 11083487 A
TITLE: INFORMATION TRANSMITTING STAKE

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 3. Document ID: JP 09115098 A

L17: Entry 3 of 14 File: JPAB May 2, 1997

PUB-NO: JP409115098A
DOCUMENT-IDENTIFIER: JP 09115098 A
TITLE: TRAVEL POSITION DETECTING DEVICE FOR VEHICLE

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 4. Document ID: JP 05145736 A

L17: Entry 4 of 14 File: JPAB Jun 11, 1993

PUB-NO: JP405145736A
DOCUMENT-IDENTIFIER: JP 05145736 A
TITLE: METHOD AND DEVICE FOR IMAGE PROCESSING AND IMAGE EDITING METHOD

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 5. Document ID: JP 04127551 A

L17: Entry 5 of 14 File: JPAB Apr 28, 1992

PUB-NO: JP404127551A
DOCUMENT-IDENTIFIER: JP 04127551 A
TITLE: INSPECTION OF EXPOSURE PATTERN

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 6. Document ID: JP 63053410 A

L17: Entry 6 of 14 File: JPAB Mar 7, 1988

PUB-NO: JP363053410A
DOCUMENT-IDENTIFIER: JP 63053410 A
TITLE: DETECTION FOR DETECTIVE COATING OF PRIMER

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 7. Document ID: JP 62232137 A

L17: Entry 7 of 14 File: JPAB Oct 12, 1987

PUB-NO: JP362232137A
DOCUMENT-IDENTIFIER: JP 62232137 A
TITLE: POSITION ALIGNING METHOD

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 8. Document ID: JP 62086740 A

L17: Entry 8 of 14 File: JPAB Apr 21, 1987

PUB-NO: JP362086740A
DOCUMENT-IDENTIFIER: JP 62086740 A
TITLE: METHOD OF INSPECTING SEMICONDUCTOR WAFER

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 9. Document ID: JP 55138250 A

L17: Entry 9 of 14 File: JPAB Oct 28, 1980

PUB-NO: JP355138250A
DOCUMENT-IDENTIFIER: JP 55138250 A
TITLE: POSITION DETECTOR

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 10. Document ID: JP 11135405 A, JP 3064997 B2

L17: Entry 10 of 14 File: DWPI May 21, 1999

DERWENT-ACC-NO: 1999-363119
DERWENT-WEEK: 200038

TITLE: Pattern data verification method for use during electron beam patterning in manufacture of large scale integrated circuit - involves comparing coordinates of specific position in figure batch shot, obtained before and after data conversion

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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Search Results - Record(s) 11 through 14 of 14 returned.

☐ 11. Document ID: EP 363178 A, DE 68907169 E, EP 363178 B1, GB 2224865 A, GB 2224865 B

Using default format because multiple data bases are involved.

L17: Entry 11 of 14 File: DWPI Apr 11, 1990

DERWENT-ACC-NO: 1990-109484
DERWENT-WEEK: 199015
COPYRIGHT 2004 DERWENT INFORMATION LTD
TITLE: Sheet handling sewing workpiece seam appts. - by viewing garment outline and comparing derived data with stored data before locating gripper accordingly

INVENTOR: GILLIAT, J; GILLAT, J

PRIORITY-DATA: 1989GB-0009126 (April 21, 1989), 1988GB-0023214 (October 4, 1988), 1989GB-0022321 (October 4, 1989)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
EP 363178 A	April 11, 1990		000	
DE 68907169 E	July 22, 1993		000	D05B021/00
EP 363178 B1	June 16, 1993	E	011	D05B021/00
GB 2224865 A	May 16, 1990		000	
GB 2224865 B	September 30, 1992		000	G05B019/18

INT-CL (IPC): D05B 21/00; G05B 19/18

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 12. Document ID: DE 3401826 A, DE 3401826 C2

L17: Entry 12 of 14 File: DWPI Oct 10, 1985

DERWENT-ACC-NO: 1985-256878
DERWENT-WEEK: 198542
COPYRIGHT 2004 DERWENT INFORMATION LTD

TITLE: Fabric cutting control - has pattern data and fabric fault coordinates in computer memory to calculate cutting action to reduce wastage

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 13. Document ID: DE 3242904 A, DE 3242904 C, EP 110171 A, EP 110171 B

L17: Entry 13 of 14 File: DWPI May 24, 1984

DERWENT-ACC-NO: 1984-134825
DERWENT-WEEK: 198422

TITLE: Vehicle position measurement device for defined region - compares navigation coordinates with stored network and derives correction values

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De

☐ 14. Document ID: DE 2514930 A, CH 604128 A, FR 2306427 A, GB 1513523 A, US 4111557 A

L17: Entry 14 of 14 File: DWPI Oct 14, 1976

DERWENT-ACC-NO: 1976-K3341X
DERWENT-WEEK: 197643

TITLE: Optial system producing pattern on object - used to determine shape deviations and shape and position changes

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw. De

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Terms	Documents
L14	14

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10/730642

L9: Entry 1 of 1 File: USPT Jun 8, 2004

DOCUMENT-IDENTIFIER: US 6748318 B1
TITLE: Advanced notification systems and methods utilizing a computer network

Drawing Description Text (12):
FIG. 10 is another high level modular diagram of the overall operation of the advance notification system described as system configurations and necessary to show the differences of individual modular configuration preferences of each system. Additionally, this configuration is a simple diagram of an advance notification system, designed to determine a vehicle location by a stop, or delivery at a particular location, without GPS or normal location devices on the vehicle. This system determines vehicle location from a delivery list and acknowledgment of each delivery to the BSCU. The address and distance to the next stop is determined by routing software, mapping software, past records of travel, and actual traffic data systems, compared in the BSCU to determine time, distance, and actual vehicle location prior to a user stop. The ability to notify a user computer as the pre-selected advance notification preferences are activated allows the system to notify the user of a message on a computer screen and/or by audio means when a vehicle is approaching. Other combinations of the configurations (FIG. 7 through FIG. 10) are used based on application, business, and customer needs.

Drawing Description Text (16):
FIGS. 14 is an example of a route list after calculations have ~~determined the route~~ stop order and the time between stops. The left side shows GPS longitude/latitude coordinates and estimated time between stops that is maintained in the VCU database, while the right side shows the mailing address and stop number to be displayed on an LCD.

8

Drawing Description Text (21):
FIG. 19 is a diagram of an example of a method for determining vehicle location without the vehicle being equipped with a location device, such as a GPS, or other devices used for odometer/distance reading device, etc., in an advance notification system. This flow chart diagram illustrates a method for determining vehicle location from a delivery list, actual delivery or attempt to deliver notices and route determining software in the BSCU and/or a user computer. The route and/or mapping software determines the vehicle path (roads) to the next stop and then calculates the distance from mapping software. Furthermore, the vehicle location is associated with time for determining a moving vehicle location. This vehicle location/time is calculated from past route data, mapping software of speed limits, stops signs, red lights, etc. and/or traffic monitoring systems with sensors normally located along the roadside. It also provides an inexpensive means for determining a vehicle time, distance, and/or location away from a home or business for activating an advance notification message of an impending arrival of a vehicle from different user preferences.

Detailed Description Text (39):
The timing information is recorded during the initialization and daily recording of vehicle locations with time, and the system 10 is used as a reference during the usual operation of the system 10 for the purpose of determining whether a delivery

vehicle 19 is at a predetermined location or time from a delivery stop. Other reference information may be obtained from software for mapping, for example, streets, vehicle speed limits, and traffic flow.

Detailed Description Text (40):
However, it should be emphasized that other methodologies could be utilized for determining the communication to or from a location sensor of a delivery vehicle 19. For example, the GPS sensor 25 may communicate with the BSCU 14 when the delivery vehicle 19 is in motion (as indicated by phantom lines in FIG. 1), additional VCU 12 timing cycles for communication controlled by the microprocessor controller 16. At particular times, the longitude and latitude readings or optionally a Universal Transverse Mercator (UTM) grid system number, could be sent. When the vehicle 19 is in a stationary position, the communication cycle controlled by the microprocessor could be slowed down to one cycle until the vehicle is in motion again, compared to reference longitude and latitude or (UTM) information readings which were obtained on a cycle per minute when the vehicle is in motion 10. In this way, the determination of the location of a delivery vehicle 19 could be accomplished by less communication to and from the VCU 12 and BSCU 14.

Detailed Description Text (41):
Another methodology, which could be utilized for the timing cycles of communication to and from the delivery vehicle 19 involves interfacing the BSCU 14 with wireless communication protocols. The BSCU 14 system is equipped with communication software for contacting each VCU 12 and asking for GPS longitude and latitude information or Universal Transverse Mercator (UTM) grid system information from the VCU 12 on each delivery vehicle 19. The vehicle 19 location may be polled in normal communication protocols, such as contacting each VCU 12 in a first to last cycle with vehicles 19 in motion or on a normal clock cycle for minimizing communication to and from the VCU 12 and BSCU 14. The received delivery vehicle 19 location (longitude and latitude or Universal Transverse Mercator (UTM) grid system information) from the VCU 12 to the BSCU 14, is calculated from the time and/or distance away from a stop using mapping technology for road distances, and additional speed limits, actual traffic averages, and other means for better calculation accuracy.

Detailed Description Text (45):
First in FIG. 13, the delivery vehicle 19 ignition is switched on, as indicated at block 45a. At the beginning of each route, the system 10 could be configured to automatically initialize itself upon power up of the VCU 12. The delivery door opening or a bar code scanner initiating communication, or both, could activate the powering up. Further, the BSCU 14 could be programmed to initiate itself after the vehicle 19 moves to a predefined distance or location, such as a waypoint (longitude and latitude or Universal Transverse Mercator (UTM) grid system information area), determined by the positioning system 25. This initialization action causes the microprocessor controller 16 to inform the BSCU 14 of the vehicle 19 location and the beginning of its route. The foregoing action is indicated at flow chart block 45b (FIG. 13). Alternatively, the vehicle 19 driver can press the start/reset switch 21 on the VCU 12 system menu 21 to initialize the BSCU 14 for restarting the route tracking sequence. Additionally, driver/user options may be accessed by the user controls on the VCU 12.

Detailed Description Text (47):
Next, as indicated at flow chart block 45c (FIG. 13), the VCU 12 determines, continuously or periodically, the location of the delivery vehicle 19 by the positioning system 25 and sends the BSCU 14 (FIG. 1) the location information in view of the planned route or stop sequence data (derived from initialization of the packages on the vehicle 19 and/or mapping technologies). In the preferred embodiment, the BSCU 14 at least compares the delivery vehicle 19 current location with the planned route location derived from the logistics of current mapping and route planning technology (FIG. 10) for determining time and/or distance away from a user stop. By comparing previous vehicle 19 routes with time differences between

waypoints (longitude and latitude points or Universal Transverse Mercator (UTM) grid system information points an average route timing data base may be used to calculate the time to travel from actual vehicle locations to the impending arrival time at a particular stop. Additional traffic flow measurements may be added by comparing time of day, actual live traffic flow sensors, or other methods.

Detailed Description Text (49):
While the delivery vehicle 19 actual locations are compared to the existing travel time and distances (FIG. 15), the BSCU 14 is also storing actual location events (time between longitude and latitude or Universal Transverse Mercator (UTM) grid system information points) for averaging with the planned route/travel time over distances. When the BSCU 14 begins sending messages to user computers 29 at a predefined time, distance, location, and/or prior stop, for the impending arrival of a delivery vehicle 19, each particular user computer 29 receives an electronic message and is displayed on their screen, as indicated in flow chart block 145a (FIG. 16). In one example, as shown in FIG. 16, at waypoint number 20 (140c) along the delivery route, the BSCU 14 places a message (144c) to a user computer 29 at waypoint 30 (140d) of the delivery vehicle 19 actual location. A second example in FIG. 16, shows a user being notified when the vehicle 19 is one mile away (144d) 14c from waypoint 30 (144d). The third example in FIG. 16, shows a user being notified when the vehicle is at a redefined street location (144b). This is accomplished by comparing street mapping software with included longitude/latitude or Universal Transverse Mercator (UTM) grid system information coordinates, notification requests, and the (BSCU) 14 vehicle location data base (VLDB). As shown in the configurations (FIGS. 15 and 16), time is used to cross reference travel between locations. Determining vehicle location 19, between communication updates, is achieved by comparing times of prerecorded route information, actual live traffic monitoring systems, and statistical data.

Detailed Description Text (50):
Additionally, preferences for activation of advance notification warnings are shown in FIGS. 33, 34, 35, 36, 37, and 38. After a preference is selected from the end user, the data is normally placed into the Notification Data Base (NDB) 14c after calculations have been made from the address entered into the BSCU computer 32 (FIG. 1) from a network connection as shown in FIGS. 30 and 31, or ANS software residing on their computer, with or without a network connection. The other calculation of information is in finding an actual longitude/latitude or Universal Transverse Mercator (UTM) grid system information coordinate of each home, business, street address, or most other places on the earth's surface, which can be found with existing mapping software. The Universal Transverse Mercator (UTM) is one grid system that eases the conversion of GPS readings to map data.

Detailed Description Text (51):
Another example compares the list of stops with the vehicle 19 location and determines the last occurrence before the delivery vehicle will cross the predefined marker points to activate the impending arrival message 19.

Detailed Description Text (54):
For example, FIG. 14 shows a finished delivery route that started at seven thirty. After starting the delivery route, the delivery vehicle arrives at stop number 001 at 07:37:22AM as depicted by information block 610 after driving seven minutes and twenty-two seconds as depicted by information block 609. Stop 001 takes two minutes to unload all of the packages and another two minutes and ten seconds to reach stop 002 at 07:41:32AM. Stop 003 takes five minutes and forty-five seconds from the time the vehicle 19 arrived at stop 002. The arrival at stop 004 is on time but the delivery takes an unexpected ten minutes and causes a ten-minute delay in the scheduled route as depicted by information block 614 and 615. The scheduled route list was rescheduled by the delay depicted by block 615 of ten minutes and stop 005 was reached ten minutes later than the scheduled planned route, at 08:13:34AM. The VCU 12 display 602 in FIG. 14 is an example of the information that the driver sees

and uses. The other route information 601 shown in FIG. 14 is not needed for driver interaction and is a VCU 12 automatic component for lowering the wireless communication between BSCU 14 and the VCU 12. Although not disclosed in this example, additional directions with or without map displays, estimated route completion times, on or off normal schedule indicators, and others may also be displayed on the VCU 12 display module 33. Just prior to leaving a stop, the driver views his next stop on the display module 33. Additional directions can be activated by the drivers' input or automatically after a predefined time period or a predefined distance the vehicle 19 has traveled. The automatic display changes may start when the driver arrives at a stop by displaying the next location. The display shows the next address until the vehicle 19 has started moving and the display cycles between the next stop's address and a map display showing directions. The display continues to cycle until the vehicle 19 arrives at the next stop, then the sequence repeats.

Detailed Description Text (71):
Moreover, as indicated by FIG. 45, a personal 29 computer with ANS software can process the user requests and contact the BSCU data base 170 for two primary reasons. First the personal computer with ANS software can be used for retrieving information from the BSCU data base 170 and for using the information for activating impending arrival messages after the computer is disconnected from the computer network 300. Second, the BSCU data base 170 may be contacted before and/or in place of an impending arrival message sent from the BSCU 14. Each person's computer 29 when operating ANS software (block 171), looks up user preferences in block 172 and checks for a network connection in block 173. If the network connection is not active, the ANS software starts the network software, then a request is sent to an area of the BSCU 14 for vehicle information in block 174. An identification number associated with the person's street address processes the request from the person's computer 29. As depicted by blocks 176-181, the address is looked up, then vehicles 19 approaching this address can be identified, with vehicle names, 179 vehicle locations and route stops with past vehicle records 19 and directions from one stop to the next 181. Additionally, cargo or other delivery information in block 182 is then sent back to the personal computer 29 operating ANS software for activation of impending arrival messages and displays in block 175, based on the user preferences. Furthermore, this configuration offers an individual with only one communication channel (phone line) the ability to be notified when the communication channel is being used or is not available when an impending arrival message is sent from the BSCU 14.

Detailed Description Text (74):
Worth noting also, are the methods for determining the actual directions (roads to be taken) of a vehicle 19 from one stop 36 to the next which may be described, but not limited to, three areas. The first configuration contains dual route information in the BSCU 14 and VCU 12. Preferably, the VCU 12 displays road names or a mapping diagram for the driver to follow. The BSCU 14 has the same information for determining the route a vehicle 19 is likely to take. The second configuration determines the closest and/or quickest route from one stop to the next by comparing mapping software, actual and past traffic flow. A third configuration is determined by past vehicle 19 delivery routes. As found in the art of route management, most delivery vehicle 19 drivers have roads and routes each individual prefers to take. Some of these routes are known to take more time, but for the determining factors associated with an advance notification system, these records provide a better means of determining distance, time, locations on a map, etc., when the driver's company policies do not request the following of predefined or displayed sequence of roads. In the preferred embodiment some, all, and additional methods may be used.

Detailed Description Text (88):
While the route is in progress, the BSCU 14 can determine from the mapping software, current route data, and past recorded route data, when to send a VCU 12 a

request to use cycle communication. Moreover, in the situation where the delivery vehicle VCU 12 has stopped sending vehicle 19 location communication to the BSCU 14, as requested by the BSCU 14 or in-between communication cycles from the VCU 12, the BSCU 14 can determine the estimated vehicle 19 location from past routes, delivery lists, mapping software, and additional road/traffic monitoring systems for controlling the communication of the VCU 12. When the vehicle 19 has reached a cycle completion, predetermined by location or time and known by the BSCU 14 and VCU 12, a communication link to the BSCU 14 is not necessarily made at this time. As the communication method is changed back to route comparison 14a (FIG. 15), if the vehicle's planned route location 140a matches it's actual route location, communication to the BSCU 14 is not needed. Essentially, the communication methods are controlling the overall communication loading needed for vehicle 19 location and messaging associated with the vehicle 19 location between the BSCU 14 and the VCU 12. To better understand clock cycles: clock cycles are time (minutes/seconds) lapses or distance lapses for particular location points (longitude/latitude numbers from GPS) or actual miles, and are started, controlled (more/less), and used for decreasing communication from a delivery vehicle VCU 12 to the BSCU 14.

Detailed Description Text (89):
Finally, as shown in FIG. 21, the BSCU 14 may slow down or speed up the communication clock cycle by determining the Vehicle Location Determining Factor (VLDF) in block 99. The VLDF is used to determine the likelihood of delays between two stops. To determine the VLDF rating, the current vehicle location, the next stop and route to the next stop are compared to past route records as depicted by blocks 100-104. If the vehicle 19 is likely to travel the same speed and take the same amount of time as previously recorded vehicles, the communication cycle is slowed down.

Detailed Description Text (102):
The first attempt to correct the list is a flashing screen from the VCU 12 for the driver. If the driver responds, menus of questions are asked and the driver responses are recorded from the switches 21, 22, and 23 (FIG. 1). On screen questions are "is this delivery out of order?" if the driver selects yes, "is (address) your next stop?" if yes the information is uploaded to the BSCU 14 and the route continues, if no, a choice is given from the route list, and the driver is asked to highlight the next stop. The information is then uploaded to the BSCU 14. When the process is not corrected by the driver, then the BSCU 14 process determines the driver intent by comparing the vehicle direction, locations to closest stops, and past times of deliveries to these stops, with destinations from the route list, and makes a calculated determination of the driver's intent. The new sequence of stops is downloaded into the VCU 12 and the next stop location and question "is this correct" is displayed to the driver. Normally one of two events occurs, the driver responds or the vehicle arrives at a stop. If none of the switches 21, 22, or 23 have been actuated, then the process 76 will loop back around and begin once again. Otherwise, if actuation of a switch 21, 22, or 23 is detected, then the process will determine which of the switches 21, 22, 23 have been actuated.

Detailed Description Text (111):
When a person selects to define a particular area for impending arrival activation, the person can choose a circle around their home/business, as shown in FIG. 36. The circle can be adjusted by pulling the edge with a computer mouse left button held down and releasing when the circle is at a desired size. The activation points are the edges of the circle and/or areas with streets. The next option for selecting an area is the grid perimeter/s (FIG. 37). The actual squares (or other shapes) can be clicked with the left button on a mouse for highlighting areas and adjusting the highlighted areas with the slide bars at the bottom or right for precise positioning for activating impending arrival messages. The next option is placing street markets (FIG. 38) on roads and highways for activation points for impending arrival messaging. The street markers are positioned with a computer's mouse,

normal drag and drop operations onto actual areas. Additionally, other areas, such as waypoint/s (longitude/latitude areas), prior vehicle stop/s, letting the vehicle define customer offering services, etc. can be used as well.

Current US Original Classification (1):
701/201

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L3: Entry 3 of 7 File: USPT May 20, 2003

US-PAT-NO: 6567745
DOCUMENT-IDENTIFIER: US 6567745 B2

TITLE: System and method for distributed navigation service

DATE-ISSUED: May 20, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fuchs; Axel	Park Ridge	IL		
Bullock; James Blake	Gilbert	AZ		
Gee; Robert A.	Tempe	AZ		
Gonsalves; Stanislaus	Elgin	IL		
Kohley; Jeffrey	Carol Stream	IL		
McNulty; Mark	Carol Stream	IL		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Motorola, Inc.	Schaumburg	IL			02

APPL-NO: 10/ 184755 [PALM]
DATE FILED: June 28, 2002

PARENT-CASE:
RELATED U.S. APPLICATION DATA Continuation of Ser. No. 09/667,354, Sep. 22, 2000, now issued as U.S. Pat. No. 6,421,607.

INT-CL: [07] G01 C 21/00

US-CL-ISSUED: 701/209; 701/211, 340/988
US-CL-CURRENT: 701/209; 340/988, 701/211

FIELD-OF-SEARCH: 701/25, 701/117, 701/118, 701/119, 701/201, 701/209, 701/211, 340/905, 340/988, 340/990, 340/995

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4812843	March 1989	Champion, III et al.	

☐	5760713	June 1998	Yokoyama et al.	
☐	5790974	August 1998	Tognazzini	
☐	6421607	July 2002	Gee et al.	701/209

ART-UNIT: 3661

PRIMARY-EXAMINER: Beaulieu; Yonel

ATTY-AGENT-FIRM: Wills; Kevin D.

ABSTRACT:

A distributed navigation system and method for providing driving instructions to a user. The system includes a service center having a navigation server and associated workstations. The service center stores driving instructions in a continuously updated map database. In response to a user request the instructions are transmitted by way of a wireless network to a client device residing in the user vehicle. The instructions are assembled into sequential stepwise driving directions and stored in a storage device in the client device. Commands from the user trigger playback of the driving instructions in a stepwise fashion.

20 Claims, 4 Drawing figures

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L10: Entry 1 of 1 File: USPT Jun 8, 2004

DOCUMENT-IDENTIFIER: US 6748318 B1
TITLE: Advanced notification systems and methods utilizing a computer network

Drawing Description Text (12):
FIG. 10 is another high level modular diagram of the overall operation of the advance notification system described as system configurations and necessary to show the differences of individual modular configuration preferences of each system. Additionally, this configuration is a simple diagram of an advance notification system, designed to determine a vehicle location by a stop, or delivery at a particular location, without GPS or normal location devices on the vehicle. This system determines vehicle location from a delivery list and acknowledgment of each delivery to the BSCU. The address and distance to the next stop is determined by routing software, mapping software, past records of travel, and actual traffic data systems, compared in the BSCU to determine time, distance, and actual vehicle location prior to a user stop. The ability to notify a user computer as the pre-selected advance notification preferences are activated allows the system to notify the user of a message on a computer screen and/or by audio means when a vehicle is approaching. Other combinations of the configurations (FIG. 7 through FIG. 10) are used based on application, business, and customer needs.

Detailed Description Text (47):
Next, as indicated at flow chart block 45c (FIG. 13), the VCU 12 determines, continuously or periodically, the location of the delivery vehicle 19 by the positioning system 25 and sends the BSCU 14 (FIG. 1) the location information in view of the planned route or stop sequence data (derived from initialization of the packages on the vehicle 19 and/or mapping technologies). In the preferred embodiment, the BSCU 14 at least compares the delivery vehicle 19 current location with the planned route location derived from the logistics of current mapping and route planning technology (FIG. 10) for determining time and/or distance away from a user stop. By comparing previous vehicle 19 routes with time differences between waypoints (longitude and latitude points or Universal Transverse Mercator (UTM) grid system information points an average route timing data base may be used to calculate the time to travel from actual vehicle locations to the impending arrival time at a particular stop. Additional traffic flow measurements may be added by comparing time of day, actual live traffic flow sensors, or other methods.

Detailed Description Text (51):
Another example compares the list of stops with the vehicle 19 location and determines the last occurrence before the delivery vehicle will cross the predefined marker points to activate the impending arrival message 19.

Current US Original Classification (1):
701/201

Other Reference Publication (15):
"PROMISE--Personal Mobile Traveller and Traffic Information Service--Specification of Promise Services, Ver. 7", Telematics Application Programme A2, Transport, Jul. 1, 1996.

(14)

Other Reference Publication (16):
"PROMISE--Personal Mobile Traveller and Traffic Information Service--Generic Promise System Architecture, Ver. 2", Telematics Application Programme A2, Transport, Sep. 10, 1996.

Other Reference Publication (17):
"PROMISE--Personal Mobile Traveller and Traffic Information Service--Summary of Promise Public Relation Activities, Ver. 1", Telematics Application Programme A2, Transport, Feb. 12, 1999.

Other Reference Publication (47):
Dailey, D.J., "Demonstration of an Advance Public Transportation System in the Context of an IVHS Regional Architecture", Proceedings of the First World Congress on Application of Transport Telematics and Intelligent Vehicle-Highway Systems, Nov. 30-Dec. 3, 1994, Paris, France, pp. 3024-3031.

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L6: Entry 1 of 1 File: USPT Jun 8, 2004

US-PAT-NO: 6748318
DOCUMENT-IDENTIFIER: US 6748318 B1

TITLE: Advanced notification systems and methods utilizing a computer network

DATE-ISSUED: June 8, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Jones; Martin Kelly	Dalton	GA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
ArrivalStar, Inc.	Delray Beach	FL			02

APPL-NO: 08/ 852119 [PALM]
DATE FILED: May 6, 1997

PARENT-CASE:
This document is a continuation of and claims priority to the following copending U.S. applications: (a) provisional application entitled, "ADVANCE NOTIFICATION SYSTEM AND METHOD UTILIZING A COMPUTER NETWORK," filed Mar., 10, 1997 by M. K. Jones and assigned serial No. 60/039,925;(b) nonprovisional application entitled, "ADVANCE NOTIFICATION SYSTEM AND METHOD UTILIZING PASSENGER-DEFINABLE NOTIFICATION TIME PERIOD," filed May 2, 1995 by M. K. Jones and assigned serial No. 08/434,049 now U.S. Pat. No. 5,623,260; (c) nonprovisional application entitled, "ADVANCE NOTIFICATION SYSTEM AND METHOD UTILIZING VEHICLE PROGRESS REPORT GENERATOR," filed May 2, 1995 by M. K. Jones and assigned serial No. 08/432,898 now U.S. Pat. No. 5,657,010; and (d) nonprovisional application entitled, "ADVANCE NOTIFICATION SYSTEM AND METHOD UTILIZING PASSENGER CALLING REPORT GENERATOR," filed May 2, 1995 by M. K. Jones and assigned serial No. 08/432,666 now U.S. Pat. No. 5,668,543; where documents (b), (c), and (d) are each a continuation-in-part of the application entitled "ADVANCE NOTIFICATION SYSTEM AND METHOD UTILIZING A DISTINCTIVE TELEPHONE RING, "filed Mar. 20, 1995 by M. K. Jones and assigned serial No. 08/407,319, now abandoned, which in turn is a continuation-in-part of an application entitled "ADVANCE NOTIFICATION SYSTEM AND METHOD" filed May 18, 1993 by M. K. Jones et al. and assigned serial No. 08/063,533, now U.S. Pat. No. 5,400,020 to M. K. Jones et al. that issued on Mar. 21, 1995.

INT-CL: [07] G01 C 21/30, G08 G 1/123

US-CL-ISSUED: 701/201; 701/204, 340/994, 340/992, 340/996, 455/412.1, 455/414.2
US-CL-CURRENT: 701/201; 340/992, 340/994, 340/996, 455/412.1, 455/414.2, 701/204

FIELD-OF-SEARCH: 701/117, 701/23, 701/24, 340/990, 340/991, 340/994, 340/300, 340/988, 340/993, 342/352, 342/357, 342/457, 455/457, 455/456, 455/461, 455/411, 455/403, 711/109

PRIOR-ART-DISCLOSED:

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ART-UNIT: 3661

PRIMARY-EXAMINER: Cuchlinski, Jr.; William A.

ATTY-AGENT-FIRM: Thomas, Kayden, Horstemeyer & Risley, LLP

ABSTRACT:

An advance notification system notifies users of the impending arrival of a vehicle, for example, an overnight package delivery vehicle, at a particular vehicle stop. The system generally includes an on-board vehicle control unit (VCU) for each vehicle and a base station control unit (BSCU) for sending messages to user computers in order to inform the users when the vehicle resides at a certain predefined time period, distance, prior stop, and/or location point from the vehicle stop. Moreover, vehicle tracking, the BSCU, a computer network (e.g., the Internet), and software located on a user computer may be combined in a plurality of configurations for launching and communicating a message of the impending arrival of a particular vehicle before it arrives. Significantly, the computer message is to advise of the impending arrival and preferably will exhibit a distinctive display and/or sound on the recipient computer so that the recipient is informed of the message. The VCU sends vehicle location and/or stop information to the BSCU. The BSCU compares the vehicle route stop list with route management software, then determines when to send an impending arrival message by preferences, normally chosen by the system operator or a user preparing to receive the advance notification message. The user computer displays information associated with the impending arrival of a vehicle in the form of the name of the vehicle, when the vehicle has finished a previous delivery, the miles before a stop, the time before arriving, and/or an actual location of a vehicle when a vehicle reaches a certain point/place. Additionally, other addressable communication devices could be used in place of or in addition to the computer message, such as personal pagers, mobile telephones, television box de-scramblers, etc. Users may also contact the computer

site and/or computer address for impending arrival information.

138 Claims, 50 Drawing figures

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☐ 1. Document ID: US 6748318 B1

L1: Entry 1 of 10 File: USPT Jun 8, 2004

US-PAT-NO: 6748318
DOCUMENT-IDENTIFIER: US 6748318 B1

TITLE: Advanced notification systems and methods utilizing a computer network

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw D

☐ 2. Document ID: US 6650284 B1

L1: Entry 2 of 10 File: USPT Nov 18, 2003

US-PAT-NO: 6650284
DOCUMENT-IDENTIFIER: US 6650284 B1

TITLE: Information system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw D

✓ ☐ 3. Document ID: US 6597906 B1

L1: Entry 3 of 10 File: USPT Jul 22, 2003

US-PAT-NO: 6597906
DOCUMENT-IDENTIFIER: US 6597906 B1
**** See image for Certificate of Correction ****

TITLE: Mobile client-based station communication based on relative geographical position information

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw D

X ☐ 4. Document ID: US 6594564 B1

L1: Entry 4 of 10 File: USPT Jul 15, 2003

US-PAT-NO: 6594564
DOCUMENT-IDENTIFIER: US 6594564 B1

TITLE: Data device for a motor vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 5. Document ID: US 6567745 B2

L1: Entry 5 of 10 File: USPT May 20, 2003

US-PAT-NO: 6567745
DOCUMENT-IDENTIFIER: US 6567745 B2

TITLE: System and method for distributed navigation service

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 6. Document ID: US 6553308 B1

L1: Entry 6 of 10 File: USPT Apr 22, 2003

US-PAT-NO: 6553308
DOCUMENT-IDENTIFIER: US 6553308 B1

TITLE: Vehicle-based navigation system with smart map filtering, portable unit home-base registration and multiple navigation system preferential use

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 7. Document ID: US 6526352 B1

L1: Entry 7 of 10 File: USPT Feb 25, 2003

US-PAT-NO: 6526352
DOCUMENT-IDENTIFIER: US 6526352 B1

TITLE: Method and arrangement for mapping a road

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 8. Document ID: US 6327522 B1

L1: Entry 8 of 10 File: USPT Dec 4, 2001

US-PAT-NO: 6327522
DOCUMENT-IDENTIFIER: US 6327522 B1

TITLE: Display apparatus for vehicle

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 9. Document ID: US 6169515 B1

L1: Entry 9 of 10 File: USPT Jan 2, 2001

US-PAT-NO: 6169515
DOCUMENT-IDENTIFIER: US 6169515 B1

TITLE: Navigation information system

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

☐ 10. Document ID: US 6067501 A

L1: Entry 10 of 10 File: USPT May 23, 2000

US-PAT-NO: 6067501
DOCUMENT-IDENTIFIER: US 6067501 A

TITLE: Process and device for selecting traffic information

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
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Accuracy and Resource Consumption in Tracking and Location Prediction[1]

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Abstract. Tracking is an enabling technology for many location based services. Given that the location of a moving object changes continuously but the database cannot be updated continuously, the research issue is how to accurately maintain the current location of a large number of moving objects while minimizing the number of updates. The traditional approach used in existing commercial transportation systems is for the moving object or the cellular network to periodically update the location database; e.g. every 2 miles. We introduce a new location update policy, and show experimentally that it is superior to the simplistic policy currently used for tracking; the superiority is up to 43% depending on the uncertainty threshold. We also introduce a method of generating realistic synthetic spatio-temporal information, namely *pseudo trajectories* of moving objects. The method selects a random route, and superimposes on it speed patterns that were recorded during actual driving trips.

1 Introduction

Miniaturization of computing devices, and advances in wireless communication and sensor technology are some of the forces that are propagating computing from the stationary desktop to the mobile outdoors. Some important classes of new applications that will be enabled by this development include location-based services, tourist services, mobile electronic commerce, and digital battlefield. Tracking, i.e. continuously maintaining in a database the transient location of a moving object, is an enabling technology for these application classes. Other application classes that will benefit from tracking include transportation and air traffic control, weather forecasting, emergency response, mobile resource management, and mobile workforce.

Often, tracking enables tailoring the information delivered to the mobile user in order to increase relevancy; for example delivering accurate driving directions, instant coupons to customers nearing a store, or nearest resource information like local restaurants, hospitals, ATM machines, or gas stations.

In addition to enabling applications, tracking is also a fundamental component of other technologies such fly-through visualization (visualized terrain changes

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continuously with the location of the user), context awareness (location of the user determines the content, format, or timing of information delivered), and augmented reality (location of both the viewer and the viewed object determines the types of information delivered to viewer).

As defined, tracking involves continuously maintaining in a database the current location of moving objects. The location of a moving object is sensed either by the cellular network using techniques of triangulation among the cellular towers, or by a Global Positioning System (GPS) receiver on board the moving object. In either case, for tracking the location is transmitted to the database. Given that the location of a moving object changes continuously, but the database cannot be updated continuously, the research issue is how to accurately maintain the current location of a large number of moving objects while minimizing the number of updates.

The traditional approach used in all existing commercial transportation systems (see for example [19, 20]) is for the moving object or the cellular network to periodically update the location database; e.g. every 2 miles, or every 5 minutes. The advantage of the distance update policy, which updates the database every x distance units, is that it provides a bound on the error in response to database queries. Specifically, in response to a query: "what is the current location of m?" the answer is: within a circle of radius x, centered at location l (provided in the last database update). Similarly, in an augmented reality or context awareness application, if a Personal Digital Assistant (PDA) can hold images or graphics that pertain to an interval of 20 meters, then the moving object will provide its location every 20 meters, and get the next set of images from the database.

In this paper we introduce and evaluate an alternative to the commonly used distance update policy. It pertains to motion on the road network given by a map, and it improves the performance of tracking by location prediction. In this sense it is a location *prediction* policy as much as a location *update* policy, but we will still use the term update for uniformity. It called the deviation policy, and it predicts that following a location update, the moving object will continue moving on the same street. This assumption provides an *expected* location at any point in time after each location update, and thus in response to future queries it will provide the expected location. The moving object or the network will update the database whenever the *actual* location deviates from the expected location by more than a given threshold x. Thus, in terms of accuracy, the deviation policy is identical to the distance policy in the sense that both allow for a maximum location error; in other words, given the same *threshold* x, both methods have the same location uncertainty. Thus one can compare how many updates are required by each policy to maintain a given uncertainty threshold x. This is a measure of the location prediction power of the deviation policy. We discover that the deviation policy is up to 43% more efficient than the distance policy (which is currently the state of the art) in the sense that to maintain an uncertainty threshold of 0.05 miles the distance policy uses 43% more updates than the deviation policy. The advantage of the deviation policy decreases as the uncertainty threshold increases, but it is always better than the distance policy.

Now consider a data streaming application in virtual or augmented reality, or fly through visualization. Suppose that a vehicle is driving through a city and at any point in time it needs to show on the passenger's handheld computer the objects (buildings, stores, mountains) within r miles of the vehicle's current location. Suppose that the

Another direction for future work is a better speed-prediction for the deviation policy. More generally, how does the future speed of a moving object depend on its past speed behaviour? The pseudo trajectory generation algorithm will come in handy for answering this question.

Another direction of future work is to determine whether our results hold for trajectories generated in rural areas and in foreign countries.

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